# Probabilistic Music Generator
# Progress Report

Group 258

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## Project Overview

There are two purposes to our project. The first create algorithms to generate probabilistically generated music. The second is to assist Roger Green's DSP scholar team in the development of an evaluation board based on TI's TMS320F2812. These two will be combined to create a standalone platform that plays music.

## Process Scope

As mentioned in our Requirements Capture we had eight different components to meet for this project.

1. The project will be based on the scholar team's TI 2812 DSP processor board.
2. The device must have a JTAG interface (in circuit programming).
3. The device must be able to take in different sets of probability to model different styles of music (e.g. rock, classical, children's' music.)
4. The device must be able to generate notes.
5. The device must be able to generate music via algorithms.
6. The device must be able to output the audio signal it is generating.
7. The output needs to have a 44.1 kHz sampling rate.
8. It must be a standalone device.

We have completed seven of the eight requirements. The last thing that we have to accomplish is having the device be standalone.

## Work Completed

Our project is progressing better than we had planned. We already have a fully functional circuit-board and we are starting to implement our algorithms on the TI 2812 DSP. Dave has spent many hours debugging and repairing the current board and the second board has been ordered (Appendix A). Bryce had most of the algorithms running in MatLab within the first few months of the project (Appendix B), and now Chad is implementing the code on the TI2812 DSP (Appendix C). As of now, the board can synthesize 12 different notes, each with 10 variable harmonics, and use them to play randomly generated music.

## Future Work

We have made a lot of progress but we still have plenty of work to complete. We need to design and build a daughter card for the main circuit board. This card will be used to interface buttons and an LCD display to the processor, and also have any other circuitry that we decide to add. We are looking at maybe adding a preamp so that we can use headphones on the output instead of just amplified speakers. Most of our code is written, but we still have to write routines to interface the buttons and LCD. Also, we will continue to refine our algorithms in order to make 'better' probabilistic music. The last part of the project will be the enclosure. One option we are currently considering is building one from sheet aluminum.

## Timeline

Second Semester

| Task Name | Jan | | | Feb | | | | March | | | | | April | | | | May | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| weeks | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 1 | 2 |
| Update time line | G | R | O | U | P | | | | | | | | | | | | | |
| Research Enclosure | | | | C | H | A | D | / | B | R | Y | C | E | | | | | |
| Research Note Generation | | | G | R | O | U | P | | | | | | | | | | | |
| Finalize Algorithms | B | R | Y | C | E | | | | | | | | | | | | | |
| Upload Code and test | C | H | A | D | | | | | | | | | | | | | | |
| Populate and test board | | | | | D | A | V | E | | | | | | | | | | |
| Documentation | | | | G | R | O | U | P | | | | | | | X | | | |
| Revise Board Layout | | | D | A | V | E | | | | | | | | | | | | |
| Implementing Algorithms | | | C | H | A | D | / | B | R | Y | C | E | | | | | | |
| Finish up lose ends | | | | | | | | | | | G | R | O | U | P | X | | |
| Prepare for Presentations | | | | | | | | | | G | R | O | U | P | | X | | |

We are pretty much on track at worse for this project. I thought I might have been a little behind on the board getting out but that is right about on time. Dave would like more time to trouble shoot the next board, but it will be done and ready to go when it is needed. Everything else is on track or ahead of track.

## Assessment

We are on track to complete this project on or before the deadline. Right now we have running code on our processor that is generating sine waves and notes in a random way. We have a working board and are in the process of getting our second board out. Because of the enormous amount of time that we put in during winter break, the only requirement that we haven't met is the standalone device requirement. Everything else has been met and we are now spending our time upgrading and improving our device.

## Budget

| Item | True Value | Acquired Cost |
|---|---|---|
| Revision PCB (Four Layer) | $200 | $0 |
| 2812 DSP (1) | $25 | $0 |
| Codec (1) | $8 | $0 |
| Voltage Regulator (1) | $4.50 | $0 |
| Op-Amps (2) | $4.50 | $0 |
| LEDs (20) | $5 | $3 |
| Darlington Array (1) | $0.75 | $0 |
| Inverter Chip (1) | $0.44 | $0 |
| EMI Suppressor (2) | $2.80 | $0 |
| Other Inexpensive ICs | $5 | $0 |
| Passives (Resistors, Capacitors) | $30 | $0 |
| 5V Wall-Wart | $10 | $10 |
| Buttons (10) | $10 | $10 |
| Batteries and charger | $30 | $30 |
| LCD (2) | $80 | $80 |
| Enclosure | $100 | $100 |
| Incidentals | $100 | $100 |
| JTAG Interface (510) | $1200 | $0 |
| Code Composer | $500 | $0 |
| EZ-DSP Board | $325 | $0 |
| | | |
| | | |
| Totals | $2640.99 | $333 |

APPENDIXIES